

## Emerging Technology:

### 2004 Update on the Natural Weed Control Product for Dandelions and Other Broadleaf Weeds in Turf

#### Who We Are:

The Weed Biocontrol scientists at Agriculture and Agri-Food Canada's Saskatoon Research Centre have the mandate to identify microorganisms with potential to biologically control weeds and, to develop technologies in fermentation and formulation for their application and delivery as commercial products for weed control.

#### Situation:

In lawns, parks, and golf courses, broadleaf weeds compete for light, nutrients, moisture, and physical space disrupting the uniformity, aesthetics, and vigor of established turf. Weeds are also a major source of pollen, which contribute to allergies and other irritations. Factors such as spray drift, pesticide residues, and legislation prohibiting herbicide use underscore the importance for developing more natural methods of weed control. Public pressure is mounting to prohibit the use of chemical herbicides in parks and homeowners' lawns, where increased exposure is a risk to children, the elderly, and pets. Biological control provides a natural weed control method that can complement other tools used in integrated weed management systems.

#### Solution:

An indigenous fungus (*Phoma macrostoma*) exhibiting selective broadleaf weed control is being developed as a biological aid for the prevention of weeds in turf. The fungus was isolated from naturally-infected Canada thistle plants across Canada. A number of other broadleaf weed species including dandelion, scentless chamomile, chickweed, and white clover are also affected. There are no effects on grassy weeds (green foxtail and wild oats) or crops, such as wheat, barley, oat, millet, canary seed, and grasses.

The fungus works best when applied to soil before weed seedlings emerge. The susceptible seedlings turn white and die. Investigations continue to evaluate the potential for post-emergent applications to established weeds. Weed control is obtained when the fungus is applied to soil with a light to moderate moisture content and when the air temperature is between 10°C to 30°C.

Effective delivery may be obtained by broadcasting a granular formulation alone to the soil or by mixing with grass seed. Field trials have shown that this natural weed control product can provide 80 to 100% control of dandelion and chickweed seedlings. Innovations in research have reduced rates of application to 16 g/m<sup>2</sup>.

*Phoma macrostoma* has limited mobility in the soil, staying mostly where placed. It is not very competitive and its presence declines with time. One year after application, it is rarely detected in the soil and there are no carryover effects to subsequent crops. For these

reasons, the fungus should have minimal impact on the environment.

#### Opportunities for Use:

This natural weed control product offers potential commercial applications in:

- Areas where turf grass is being established.
- Established turf to prevent new weed infestations.
- Urban and rural municipalities that restrict chemical pesticide use in residential and public areas.
- Homeowner's lawns
- Golf courses
- Agriculture for grass seed and grain crop production
- Forestry for tree seedling nurseries

Agriculture and Agri-Food Canada has filed a patent on this technology and has a collaborative research project with Scotts Canada Ltd. for product development until 2006. This research may lead to licensing the technology for commercialization in the lawn and turf industry.



#### Publications:

- Zhou, L, Bailey, KL, and Derby, J. 2004. Plant colonization and environmental fate of the biocontrol fungus *Phoma macrostoma*. *Biological Control* 20: 634-644.
- Graupner, PR, Carr, A, Clancy, E, Gilbert, J, Bailey, KL, Derby, J, and Gerwick, BC. 2003. The Macrocidins: Novel cyclic tetramic acids with herbicidal activity produced by *Phoma macrostoma*. *Journal of Natural Products* 66: 1558-1561.
- Bailey, KL, and Derby, J. 2001. Fungal isolates and biological control compositions for the control of weeds. US Patent Application Serial No. 60/294,475, Filed May 20, 2001.

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